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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/672,620

09/26/2003

Christophe Pierrat

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12/14/2004

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EXAMINER

SCHWARTZ, JORDAN MARC

ART UNIT

PAPER NUMBER

2873

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/672,620

Applicant(s)

PIERRAT ET AL.

Examiner

Jordan M. Schwartz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 13-17 and 19-30 is/are rejected.
- 7) ☒ Claim(s) 10, 12 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9/26/03</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION***Drawings***

The Drawings are objected to for the following reason. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 1 is objected to for the following reason. Since the intended meaning could be determined from the specification and the Figures, a 112 rejection was not made but instead this lack of clarity issue is being raised in the following claim objection.

With respect to claim 1, line 5, "the sample" lacks an antecedent basis thereby creating a lack of clarity and it is suggested that it be changed to "a sample" for additional clarity.

Claim 25 is objected to because of the following informality: the claim needs to end in a period in compliance with the MPEP. Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 24-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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With respect to claim 24, that part of the claim stating "with another lens element of a projection lens" renders the claim vague and indefinite. Specifically, it is not clear if the projection lens referred to in claim 24 is intended to be the same projection lens of claim 19 or if it can refer to another and different projection lens. For purposes of examination, it is assumed that the projection lens of claim 24 is referring to the same projection lens of claim 19 and therefore it is suggested that in claim 24, line 2, "a projection lens" be changed to "said projection lens" to provide the necessary clarity.

With respect to claims 25-30, that part of the claim stating "for an incident material different than air" and "accounting for the incident material refractive index and absorption coefficient" renders the claims vague and indefinite. It is not clear what material is being referred to as the "incident material" and if applicant is referring to the material of the sample or to some other material rendering the claim vague and indefinite. Furthermore, if applicant is referring to some other material it is not clear how this other material is related to the sample or process claimed thereby further rendering the claims vague and indefinite.

In further reference to claims 25-30, that part of the claims stating "calculating fields" renders the claims vague and indefinite. The meaning of "calculating fields" is not known and the lack of clarity renders these claims vague and indefinite.

With respect to claim 28, that part of the claim stating "from a corresponding main feature" renders the claim vague and indefinite. It is not clear what applicant means by this, it is not clear what "main feature" applicant is

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referring to nor what this "main feature" is corresponding to and the lack of clarity renders the claim vague and indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Pakdaman et al.

Pakdaman et al reads on this claim by disclosing the limitations therein including the following: a lithography system (column 1, lines 8-17, column 7, lines 14-57); comprising a plurality of lens elements (Figures 4-6, column 7, line 5 to column 8, line 23); a first lens element adapted to face a source of radiation (Figure 5, element "535"); a final lens element comprising a material with an index greater than 1 (Figure 5, lens "520", Figure 4, lens "410", lens of Figure 6, column 7, lines 30-35 re index greater than 1); having a surface pressed against the sample (Figures 4 and 6, column 7, lines 5-12). The lens pressed against the sample of Pakdaman will inherently form at least some depression, however

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minor, within the sample and therefore within the surface of the sample, this being reasonably based upon Pakdaman disclosing the lens being placed in contact with the sample and the sample being formed of a very malleable material (column 7, lines 5-29). The lithography system of Pakdaman would inherently have a stage to support the sample, this being reasonably based upon what is disclosed in Figure 5, as well as it being well known in the art of lithography systems to use stages to support the sample within the system.

Claims 1, 6-9, 11, 17, 19-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Corle et al.

Corle et al reads on these claims by disclosing the limitations therein including the following: a lithography system (abstract); comprising a plurality of lens elements (Figures 2 and 3); a first lens element adapted to face a source of radiation (Figure 3, element closest to the light source or element "18"); a final lens element comprising a material with an index greater than 1 (Figures 2 and 3, element closest to the sample, column 1, line 50, column 2, lines 4-11 re index greater than 1); having a surface pressed against a sample (Figure 2, column 1, line 50); a projection lens for imaging an object of a mask onto a sample (Figure 3, column 1, line 56 to column 2, line 11); a method for manufacturing integrated circuits (column 1, line 56 to column 2, line 11); the sample having a layer adapted to be developed in response to radiation (column 1, line 56 to column 2, line 11); a layout object to be projected on the layer (Figures 3 and 5, column 1, line 56 to column 2, line 11). The lens pressed against the sample of Corle et al will inherently form at least some depression, however minor, within the sample

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and therefore within the surface of the sample, this being reasonably based upon Corle et al disclosing the lens being placed in contact with the sample (Figure 2, column 1, line 50), the sample being disclosed as comprising a photoresist (column 1, lines 56 to column 2, line 11) which are known to be made of soft malleable material, and that the photoresist is formed of a very thin layer (column 3, lines 31). The lithography system of Corle et al would inherently have a stage to support the sample, this being reasonably based upon the system being used to transfer a pattern from a photomask to a photoresist (column 1, lines 56 to column 2, line 11) which are known to use stages to support the photoresist within the system. Corle et al further discloses a soft layer coated on top of the layer (column 3, line 33 re multilayered and photoresist is inherently soft material); a mask being between the source of radiation and the plurality of lens elements and projecting an image of an object on the mask at an image plane on or near the surface of the final lens (Figures 2 and 3, column 1, lines 55 to column 2, line 11); the sample having a layer adapted to be developed in response to radiation (column 1, line 56 to column 2, line 11). The photoresist material will inherently be dispensed on top of the sample before the lens element is pressed against the sample, this being reasonably based upon what is disclosed in Corle et al, specifically that lens is being placed against the sample with photoresist to provide the required imaging onto the photoresist material (column 3, lines 31-40). Corle et al further discloses a projection lens for imaging an object of a mask onto a sample (Figures 3 and 5, column 2, line 22); a second side of the projection lens placed in contact or close proximity to a mask (Figure

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5, with the projection lens considered from immersion lens "28" to immersion lens "27" and lens "28" in close proximity to the mask). It is believed that the system of Corle et al will inherently include preventing adhesion of the lens element to the photoresist layer, this being reasonably based upon Corle et al disclosing the lens element in contact with the photoresist for imaging and not for the purpose of adhering to the photoresist. Furthermore the method of Corle et al will inherently include cleaning the lens element after exposure since the lens element is disclosed as being placed in contact with the photoresist and would require cleaning for future imaging.

Claims 1-2, 5-7, 9, 11, 13, 16-17, 19-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Wu et al.

Wu et al reads on these claims by disclosing the limitations therein including the following: a lithography system (paragraphs 0006, 0099); comprising a plurality of lens elements (paragraphs 0073 and 0099); a first lens element adapted to face a source of radiation (paragraph 0073, the Fresnel lens of the projection lens system); a final lens element comprising a material with an index greater than 1 (paragraph 0099, the lens in contact with the substrate as the final lens element and paragraph 0089 re index greater than 1); having a surface pressed against a sample (paragraph 0099); a projection lens for imaging an object of a mask onto a sample (paragraphs 0006, 0073, 0099); a method for manufacturing integrated circuits (paragraphs 0006 and 0099); the sample having a layer adapted to be developed in response to radiation (paragraph 0065); a layout object to be projected on the layer (paragraphs 0006,

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0065, 0099). The lens pressed against the sample of Wu et al will inherently form at least some depression, however minor, within the sample and therefore within the surface of the sample, this being reasonably based upon Wu et al disclosing the lens being placed in contact with the sample (paragraph 0099) and the sample being disclosed as comprising a photoresist of polyurethane (paragraph 0065). The lithography system of Wu et al would inherently have a stage to support the sample, this being reasonably based upon the system being used to transfer a pattern from a photomask to a photoresist (paragraphs 0006, 0065, 0099) which are known to use stages to support the photoresist within the system. Wu et al further discloses the material of the final lens element as silicon dioxide (claim 40); and the lens elements demagnifying by a factor greater than 4 at an image plane on or near the sample (abstract). The photoresist material will inherently be dispensed on top of the sample before the lens element is pressed against the sample, this being reasonably based upon what is disclosed in Wu et al, specifically that lens is being placed against the sample with photoresist to provide the required imaging onto the photoresist material (paragraphs 0065, 0099). Wu et al further discloses a projection lens for imaging an object of a mask onto a sample (paragraphs 0006, 0073); a second side of the projection lens placed in contact or close proximity to a mask (paragraph 0073). It is believed that the system of Wu et al will inherently include preventing adhesion of the lens element to the photoresist layer, this being reasonably based upon Wu et al disclosing the lens element in contact with the photoresist for imaging and not for the purpose of adhering to the photoresist. Furthermore the method of Wu

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et al will inherently include cleaning the lens element after exposure since the lens element is disclosed as being placed in contact with the photoresist and would require cleaning for future imaging.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pakdaman et al in view of Shafer et al.

In reference to these claims, Pakdaman et al discloses as is set forth above including that the system can be used for lithography applications for the inspection of semiconductor samples (column 1, lines 13-25, column 7, line 5 to column 8, line 23) but does not specifically disclose the material of the final lens element as claimed in claim 2 or the lenses projecting radiation of either 193 or 157 nm. Shafer et al teaches that in an optical system for lithography applications and the inspection of semiconductor samples (abstract, paragraphs 0003-0005) that it is desirable to use as the material of the lenses within the system (and therefore as the lens material of the lens closest to the sample) a material of silicon dioxide and further to use a radiation source of either 193 nm or 157 nm for the purpose of providing improved inspection imaging (paragraphs 0005, 0016, 0020, and 0044). Therefore, it would have been obvious to a person of

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ordinary skill in the art at the time the invention was made to have the system of Pakdaman et al as using the material of the final lens element as claimed in claim 2 and the lenses projecting radiation of either 193 or 157 nm since Shafer et al teaches that in an optical system for lithography applications and the inspection of semiconductor samples, that it is desirable to use as the material of the lenses within the system (and therefore as the lens material of the lens closest to the sample) a material of silicon dioxide and further to use a radiation source of either 193 nm or 157 nm for the purpose of providing improved inspection imaging.

Claims 2-5 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corle et al in view of Schuster.

Corle et al discloses as is set forth above including the lens system as a projection lens system for microlithography (column 1, line 56 to column 2, line 11) but does not specifically disclose the material of the final lens element, the wavelength of the radiation, or the demagnification factor of the system. Schuster teaches that in a projection system for microlithography (abstract) that it is desirable to use silicon dioxide and/or calcium fluoride as the lens materials, to use either a 157 or 193 nm radiation source, and for the system to provide a demagnification of about 4 or greater for the purpose of providing improved imaging (Tables, column 1, lines 27-30, column 3, line 18 to column 4, line 50). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the system of Corle et al as using silicon dioxide and/or calcium fluoride as the lens materials, to use either a 157

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or 193 nm radiation source, and for the system to provide a demagnification of greater than 4 since Schuster teaches of such features within a projection lens for microlithography for the purpose of providing improved imaging.

Claims 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corle et al or Wu et al.

Corle et al and Wu et al disclose as is set forth above but do not disclose the specific proximity correction as claimed. However, it is well known in the art of lithography systems (and as so stated in applicant's specification) to use such methods of proximity correction as claimed for the purpose of providing improved image quality. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the methods disclosed in Corle et al or Wu et al as using proximity correction as claimed since it is well known in the art of lithography systems to use such methods of proximity correction for the purpose of providing improved image quality.

Allowable Subject Matter

Claims 10, 12, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: with respect to the allowable subject matter, none of the prior art either alone or in combination disclose or teach of the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103. Specifically, with reference to claims 10, 12, and 18, none of the prior art either alone or in

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combination, disclose or teach of the claimed lithography system specifically including, as the distinguishing feature in combination with the other limitations, the claimed lens pressed against the sample or the lens in contact or close proximity with the mask as comprising a removable slab of material.

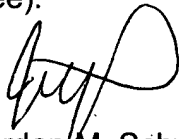
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jordan M. Schwartz whose telephone number is (571) 272-2337. The examiner can normally be reached on Monday to Friday (8:00-5:30), alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached at (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'J. Schwartz', with a large, stylized loop at the end.

Jordan M. Schwartz
Primary Examiner
Art Unit 2873
December 8, 2004